

CLAIMS

WHAT IS CLAIMED IS:

1. An electrodeionization device comprising: an anion exchange membrane; a
5 cation exchange membrane; a first electrode; at least one membrane bag formed by the anion
exchange membrane and the cation exchange membrane; a second electrode; said membrane
bag having a concentrate flow channel; a dilute flow channel located adjacent said at least one
membrane bag, said dilute flow channel including an integrated frame having an array of bars
10 spaced apart, said frame arranged to support the dilute flow channel and allow dilute water to
flow fluently therethrough; and a housing for the foregoing components.

2. The device of Claim 1, wherein the longitudinal direction of the integrated frame
is rotationally offset from the axial direction of the electrodeionization device at an angle of
about zero to sixty degrees.

3. The device of Claim 1, wherein the bars include longitudinal bars spaced from
others of the longitudinal bars between about 3 mm and 8 mm.

4. The device of Claim 1, wherein the bars include latitudinal bars having a
thickness of about 0.4 mm and 2.0 mm.

5. The device of Claim 1, wherein the integrated frame is an array of bars defining
the adjacent anion exchange membrane and cation exchange membrane.

6. The device of Claim 1, wherein the bars are rectangular in cross section.

7. The device of Claim 1, wherein the bars are rectangular with rounded edges in
cross section.

8. The device of Claim 1, wherein the bars are polygonal in cross section.

9. The device of Claim 1, wherein the bars are semi-circular in cross section.

10. The device of Claim 1, wherein the bars are triangular in cross section.
11. The device of Claim 1, wherein the bars are substantially in a parallel relationship with each other.
12. The device of Claim 1, wherein the electrodeionization device is spiral wound to form a helical electrodeionization device, and further comprising an axially extending conduit generally located along a central axis of the helical electrodeionization device.
13. The device of Claim 12, wherein said at least one membrane bag and said dilute flow channel are wound about said axially extending conduit, and said dilute flow channel is positioned between layers of said at least one wound membrane bag.
14. The device of Claim 13, wherein said integrated frame is wound about said axially extending conduit with said at least one membrane bag.
15. The device of Claim 12, wherein said second electrode is a metal member extending about the outside of said at least one membrane bag.
16. The device of Claim 12, wherein said axially extending conduit is a pipe having slotted apertures arranged to communicate fluid with said concentrate flow channel.
17. The device of Claim 12, wherein said axially extending conduit includes said first electrode.